ERMES Plenary Meeting, 14.11.2017

WG Driving Behaviour

Overview of the work to be performed in the context of the development of HBEFA 4.1

This work is currently performed in cooperation between HS Data Analysis and Consultancy and WSP Sverige AB

WG Driving Behaviour

In the context of the development of HBEFA 4.1 the following topics will be considered:

1. **General review of the traffic situation schema, evaluate extensions of existing traffic situation schema,**
2. **Assessment of potential split of cycles assigned to the traffic situations namely for rigid trucks (RT) and articulated/trailer trucks (AT/TT), possibly for light commercial vehicles (LCV, N1-I/-II vs. -III),**
3. **Validate cycles per traffic situation(s) based on cycle analysis of new data, review aggregate TS,**
4. **Review driving cycles for powered two wheelers (PTW),**
5. **Work in cooperation with WG EFs and measurements**

Review of the traffic situation schema

In the context of the general review of the traffic situation schema the following items are of major importance:

- **Stop and go**
  - **The average speed of the level of service (LOS) "Stop and Go" in HBEFA 3.3 is criticized to be too high. In some modelling cases emission factors for lower average speed cycles would be needed.**
  - **Therefore, implement an additional LOS "Heavy Stop and Go". But WG EFs requires that the average speed should be (slightly) higher than 5 km/h. Otherwise, PHEM would need an additional module to account for Ammonium in the catalyst.**

Review of the traffic situation schema

- **Add speed limits of 30 and 40 km/h for urban main streets.**
  - **This request is based on the fact that these speed limits are already in place on main streets in some cities in Europe (Sweden, Switzerland, Germany).**
  - **This is a particular sensitive issue, because these speed limits are applied with the aim to reduce air pollution. But whether this aim can be reached by this measure or not is controversially discussed.**
  - **New in-use data from such streets will be analysed, based on its availability. Currently, only data from Berlin is available.**

Review of the traffic situation schema

- **Add TS for semi-motorways.**
  - **This is a request from Sweden, where meanwhile speed limits are added, that are not covered by the existing traffic situation schema.**

Assessment of potential split of cycles assigned to the traffic situations

- **Rigid trucks (RT) and articulated/trailer trucks (AT/TT)**
  - **With respect to RT and AT/TT it was already stated in the report of the last UBA/IFEU project (No 3711 45 105, April 2015, AP 200), that the driving behaviour between RT and AT/TT is slightly different.**
  - **But it should be assessed to what extent this would influence the emissions before this split should be executed and implemented.**

Assessment of potential split of cycles assigned to the traffic situations

- **Light commercial vehicles (LCV)**
  - **With respect to LCV sometimes the question is raised whether traffic situations for LCV should be distinguished according to their size (N1-I, N1-II and N1-III).**
  - **This issue was also discussed during the development of the WLTC, the new driving cycle used for type approval within the new EU WLTP regulation (EU 2017/1151).**
  - **An analysis of the WLTP in-use database, which contains a sufficient number of N1 vehicles, showed no significant differences in the driving behaviour compared to normal cars.**

Validate cycles per traffic situation

- The validation of the driving cycles assigned to traffic situations should be based on cycle analysis of new in-use driving behavior data with additional information about the routes and the traffic load.
- To what extend this issue can be dealt with depends very much on the availability of FCD (floating car data).
- Currently, there is only data from Sweden and Switzerland available.

Review aggregate traffic situations

- The current HBEFA contains three aggregate traffic situations: urban, rural and motorway.
- There is a request from some countries/users for a more detailed system.
- There is already a concrete proposal from France in addition to urban, rural and motorway:
  - Urban non motorway, Urban motorway,
  - Rural non motorway, rural motorway,
  - Motorways in cities, motorways outside cities
- It is intended to provide this data per country, but this depends very much on the availability of traffic statistics from the countries.

Review driving cycles for powered two wheelers

- Up to HBEFA 3 the emission factors for powered two wheelers were calculated using emission functions based on a vehicle speed - acceleration matrix.
- For HBEFA 4.1 the emission factors will be calculated with the PHEM model which was meanwhile extended in order to cover powered two wheelers as well.
- In this context, the driving cycles assigned to the traffic situation schema should be assessed and amended where necessary.

Work in cooperation with WG EFs

- This topic is related to the modelling of hybrid electric vehicles (HEV) and road gradients.
- Vehicles with electric propulsion systems recharge their battery downhill (negative gradients) and may uncharge it uphill. Therefore, FC depends on the terrain as it matters whether the terrain is hilly or consists of a continuous gradient.
- Up to now the emission factors for gradient classes are calculated assuming continuous gradients.
- This would no longer be appropriate for HEV. The emission factors in PHEM have to be simulated with underlying altitude profiles corresponding to a given gradient class.

End

Thank you for your attention!